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MEAT PRICING STRATEGIES AND ADVERTISING:

A CASE STUDY



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Meat Pricing Strategies and Advertising: A Case Study

Joyce E. Schumacher and Dale Colyer

Introduction

Food retailing is an important component of the American economy. It is a complex industry in which the farmer, the processor and distributor are integrally related. Consumers spent \$262 billion on food grown on U.S. farms in 1980. The marketing bill, the difference between the amount the final consumers pay for a product and the amount producers of the product receive, accounted for \$182 billion of this total expenditure. Within the marketing bill, advertising accounted for 2 percent of the total, or \$3.64 billion (USDA, 1980).

Food retailing is a big business and will continue to grow in the 1980s as it did throughout the 1970s. The pricing behavior of the numerous food retailers is highly sophisticated as each retailer bids for the consumer's dollars. Pricing strategies and merchandising policies become more complex as food retailing departs from a purely competitive environment.

The Problem Statement

Within the grocery retailing industry, advertising is used as a tool to increase profits, increase sales, and to differentiate products. It also is common to advertise other services such as carry-out service, friendly clerks, complete "deli," check cashing, and extended hours. However, consumers may be misled and/or confused by advertising. Each week the consumer is bombarded by advertising through the mass media, including newspapers. Some of this advertising provides objective information about the product, but many advertisements are meant to be persuasive, appealing to the subconscious or desires and predilections of the consumer. Furthermore, it may be difficult for a consumer to determine if the advertised prices are lower, higher, or the same as regular prices in the supermarket. Today's consumers need be aware of and understand advertising practices in the local market so that they can maximize the use of their purchasing power.

The local newspaper is a common exposure that consumers in a local market area have to grocery advertising. Advertised products include many items in the consumer market basket of which meat is an important component. Meat, poultry, and eggs account for 32.2 percent of all food in the consumer price index (Manchester). Hence, the grocery retailer can use the advertising of meat prices to attract a consumer to the store.

Objectives

This study was undertaken to provide insights into the relationships that exist between meat pricing and advertising strategies. The general objective was to obtain information about meat advertising practices. The specific objectives were to:

1. Determine how often different cuts of meat are advertised;
2. Determine if there are significant differences between advertised prices of meats as opposed to the regular prices;
3. Determine if there are significant differences between the average meat prices of grocery stores in the same local market area;
4. Determine if significant differences between the average meat prices of chains, voluntary chains and independent stores exist;
5. Determine if there are relationships between national retail/wholesale meat prices and local retail meat prices.

Data

The primary data used for this study were collected in Morgantown, West Virginia, from grocery stores and newspapers for a period of 34 consecutive weeks in 1978 (March-October). The city of Morgantown is located in the Pittsburgh Market Area as defined by the *Progressive Grocer's Marketing Guidebook*. The 1980 Preliminary U.S. Census of Population indicated that the Morgantown area (including the towns of Star City and Westover) had a population of 33,902 (U.S. Department of Commerce).

Using the definitions of *Progressive Grocer*, the Morgantown market area consists of nine supermarkets, of which five are chain stores, three are voluntary chain stores, and one is an independent store. A chain store is one in which eleven or more retail stores are under one ownership, whereas an independent store operates in an organization with less than eleven stores. Voluntary chains are "retailers who belong to voluntary merchandising groups sponsored by wholesalers and who operate under a common name." All nine

supermarkets in the Morgantown market area were included in this study.¹

One local daily paper (*The Dominion Post*) serves the area. Its daily circulation is approximately 21,000, with a Sunday circulation of approximately 25,000. During this study, all daily advertised prices of different cuts of fresh beef, chicken, and pork were enumerated from the advertisements in the local daily paper and the Sunday edition.

Each week, each of the nine stores was visited and prices of the different cuts of meat were recorded from meat in the display cases. (It was assumed that all stores carried beef that was USDA Grade Choice, chicken that was USDA Grade A and pork that was U.S. No. 1.) Data on a large number of cuts of meat were recorded, but for purposes of comparison only the meat cuts that could be found in common in most of the stores were used for the complete analysis.

Data were obtained from the USDA on the weekly wholesale and retail prices of beef and pork. Chicken prices are not summarized on a weekly basis. The wholesale price is the value (price) of the wholesale quantity equivalent of one pound of retail cuts. The retail value (price) is the estimated weighted average price of retail cuts from the carcass (USDA, February, 1980).

Analytical Procedures

Descriptive statistics were employed to characterize the data set. To determine the manner in which the price measurements were distributed, frequency counts were performed. When necessary because of a varying number of observations, the frequency counts were converted to percentages. Averages were calculated to help describe the frequency distribution and provide a measure of central tendency.

A Duncan's Multiple Range Test (DMRT) was used to determine if there were significant differences between the mean prices of the various cuts of meat. The DMRT "... takes into account the number of treatments in the experiment ... it permits decision as to which differences are significant and which are not ... it uses a set of significant ranges, each range depending upon the number of means in the comparison" (Steel and Torries, p. 109).

Regression models were utilized to determine if linear relationships exist between the local retail prices of the selected cuts of meat and the

¹In this study, two stores, Stores 2 and 3, are in the same voluntary chain. Two stores, Stores 6 and 7, represent the same regional chain, and two stores, Stores 4 and 5, are in the same national chain.

USDA's estimated weighted average price of meat. Model I was used to estimate the relationships between the local retail prices of the selected cuts of meat and the USDA's estimated weighted average price of retail beef and pork cuts from the carcass. Model II was used to estimate the relationships between the local retail price of the selected meat cuts and the USDA's value of wholesale quantity equivalent to one pound of retail cuts. Model III was developed to discover if a linear relationship existed between the local retail prices and the national weighted average price of selected retail beef cuts lagged one week. Model IV was similar to Model III but the local retail prices were compared to the wholesale prices.

Models V and VI used a stepwise regression procedure where lagged variables for up to five weeks were added to Models I and II. In the stepwise procedure, variables are added one by one provided the variable is found to be statistically significant at a predetermined level of probability. These models were used to determine if local retail prices lagged behind either national retail or wholesale prices.

Meat Retail Pricing and Advertising Practices

This section contains a brief review of the available literature that pertains specifically to the advertising of retail meat prices, a general discussion on retail pricing behavior, a discussion of advertising practices, and a review of the current literature available on the advertising of retail meat prices.

Retail Pricing

Pricing is a complex arena where there are no exact decision tools and thus it is subject to executive judgments. The selected pricing policy can help make or break user responses to a product. Thus, pricing should be one of the more important decisions made by a firm's manager.

Pricing procedures and policies of a particular firm will vary according to the firm's marketing and company objectives. They can be used to increase sales of products. This is associated with volume objectives. Some firms seek to reach a maximum level of sales while maintaining a predetermined rate of return on investment. Another volume objective is to increase a firm's share of the market. By manipulating prices and increasing volume, a firm can obtain a more favorable position in the marketplace and help ensure its survival in the long run.

In addition to volume objectives, a firm usually has profit objectives. One common objective is to obtain a predetermined rate of return. Many factors enter into determining this rate of return and the rate is often based on the type of industry, type of product, fiscal policy, financial structure, and the degree of risk involved (Kelley). In classical economics, the pricing objective is to maximize profit. Here economists have shown profit maximization exists where marginal revenue equals marginal cost. However, most businessmen usually use a cost-plus approach. This approach determines a per unit cost and then adds a markup that is intended to cover fixed and additional variable costs plus a profit. In the grocery retailing industry, the markup or margin on product lines varies (Rhodes).

Historically, higher margins in meat and produce departments have been used by grocery retailers to offset low margins in other departments or for items on sale. Because meats tend to have large margins and are an important component of the market basket, meat prices are often reduced in the expectation of improving the total profit of a particular store.

Advertising Practices

The formulation of pricing strategies and procedures is complex and interdependent with other elements in the marketing mix, including advertising strategies. Advertising is important because it can attract attention and interest, inform or persuade, and finally lead to selling the product. For a successful campaign, the advertiser usually analyzes the market for demographic characteristics such as income, age, sex, and education. From this information the appropriate advertising strategies and media are chosen.

In a local market area, newspapers frequently are chosen as an effective way to reach a broad and specific audience. Newspapers accounted for approximately 20 percent of the advertising dollars spent during 1979 (Gallo, 1981). Advantages of this approach are relatively low costs and the serving of a target population. Food retailers use newspaper advertisements to make consumers aware of the prices on various items. It is common to see a "loss leader" used in a competitive market area. A loss leader is a very low price, which may be at or below cost, and which is used to attract customers to a store with the expectation that they will buy items other than what is advertised. The store assumes that the regular prices on the other items will make up for the losses incurred on the loss leader.

Meat Advertising

Gray and Anderson, for a case study in Palo Alto, California, during 1960, examined advertised prices recorded from weekly newspapers on many items found in the market basket. In 92 percent of their observations the advertised price of an item was lower in the stores that advertised than in those that did not. Furthermore, the average of the advertised price was found to be approximately 20 percent less.

Rhodes and Abou-Bakr found, from a study conducted on meat items in Columbia, Missouri, that the mean of advertised prices averaged 91.2 percent of non-advertised prices. The pricing policies of chain stores involved in their study suggested that the stores tried to attract customers by maintaining everyday low prices and by advertising the same competitive price for several weeks. Hence, the differences between their advertised and non-advertised prices were relatively small. The affiliated stores in their study usually had greater reductions for their advertised prices, but higher regular prices.

Rhodes, et al., in *Customer Responses to Retail Meat Prices and Ads* found two merchandising strategies for meat items. One store had an everyday low price strategy and advertised competitive prices. The second practiced advertising meats as weekly specials with greater price reductions, but had higher regular meat prices. Furthermore, it was found that advertised price reductions did result in a greater response. The store in which 58 percent of its advertised specials were price reductions had a larger sales response than the store where only 13 percent of its advertised specials were actual price cuts.

Pricing Study Results

The primary data were tabulated and frequency counts made for all cuts of meat for which prices were collected. Then, data on selected cuts of meat were tabulated and analyzed. An analysis and interpretation of prices of the selected cuts of meat grouped by advertised, unadvertised, and combined meat prices was completed. Finally, an analysis of the prices was made by type of store.

All Cuts of Meat

Frequency tables were developed from the primary data for each of the nine supermarkets and for all meats. The frequency counts for advertised meat items, unadvertised meat items, and the combined frequencies are shown in Table 1.

Table 1.
Frequency of Advertising for All Meats by Type of Meat and Store

	Regional Chain (1)	Voluntary Chain (2)	Voluntary Chain (3)	National Chain (4)	National Chain (5)	Regional Chain (6)	Regional Chain (7)	Independent (8)	Voluntary Chain (9)
ALL MEATS									
Advertised	319	165	162	269	259	218	215	303	396
Unadvertised	1199	1135	1265	1000	1144	999	945	561	950
Total	1518	1300	1427	1269	1403	1177	1160	864	1346
Percent	21	13	11	21	18	19	19	35	29
PORK									
Advertised	106	31	31	53	49	31	32	64	90
Unadvertised	253	167	237	185	305	180	157	79	116
Total	359	198	268	238	354	211	189	143	206
Percent	30	16	12	22	14	15	17	45	44
CHICKEN									
Advertised	29	44	43	69	69	11	11	56	106
Unadvertised	262	286	263	198	228	263	236	128	150
Total	291	330	306	267	297	274	247	184	256
Percent	10	13	14	26	23	4	4	30	41
BEEF									
Advertised	184	90	88	147	141	176	172	183	200
Unadvertised	684	682	765	617	611	516	552	354	684
Total	868	772	853	764	752	692	724	537	884
Percent	21	12	10	19	19	25	24	34	23

Due to the varying number of observations, the frequency counts were converted to percentages to allow meaningful comparisons. The equation used was:

$$\text{Eq. 1 } \frac{\text{Advertised Frequency}}{\text{Advertised Frequency} + \text{Unadvertised Frequency}} \times 100 = \text{Percent Advertised}$$

The table shows that when all meats are considered, one regional chain, the independent, and one of the voluntary chains advertised more often than the other stores. Each of those three stores advertised more than 300 cuts during the 34-week period. The other voluntary chain (which had two stores in the study) advertised much less than the other stores with an average of only 163 times compared to an overall average of 256 times. The differences in the frequency of total cuts advertised in each store ranged from 162 times to 396 times. Since these frequencies included all fresh meat items, the same information was tabulated by store for the meat items grouped by pork, chicken, and beef. The same independent and voluntary chain are among the stores that frequently advertise each meat type. The other voluntary chain is among the stores that advertise each meat type less frequently. Furthermore, it was found that beef is much more heavily advertised, both in number of cuts and frequency per cut, than either pork or chicken. Advertised prices for beef accounted for 60 percent of all advertised prices while chicken advertisements were 19 percent of the total and pork advertisements were 21 percent of the total.

Selected Cuts of Meat

The primary data consisted of numerous cuts of meat for which the availability and frequency of advertising varied considerably among the stores. Therefore, only those meat cuts that were found to be relatively common in most of the stores were used for the rest of this analysis. These included six cuts of pork, seven cuts of chicken, and ten cuts of beef. The selected cuts are shown in Table 2.

Frequency of Advertising

Data from all nine stores were combined and counts for advertised meats and unadvertised meats were developed. Again, due to a varying number of observations, the frequencies were converted to percentages. Based on this data, the consumer can expect to find spare ribs, pork steak, ground beef, stew meat, and round steak to be advertised in the local area about one in four weeks. Cuts such as

Table 2.

Frequency of Advertised and Non-Advertised Prices of Selected Cuts of Meat

Meat Item	Advertised	Non-Advertised	Percent Advertised
PORK			
Loin end roast	19	80	19
Rib center cut pork chops	12	176	6
Picnic	25	38	40
Loin center cut pork chops	7	219	3
Spare ribs	41	122	25
Pork steak	22	85	26
CHICKEN			
Drumsticks	25	235	10
Fryer	47	228	17
Mixed parts	106	75	59
Roasting chicken	24	144	14
Thighs	34	237	13
Wings	11	147	7
Whole cut-up	22	219	9
BEEF			
Ground beef	70	229	23
Ground chuck	56	264	18
Ground round	13	198	6
Porterhouse steak	39	221	15
Sirloin steak	27	183	13
Stew	71	190	27
T-Bone steak	38	214	15
Rump roast	59	135	30
Chuck roast	10	75	12
Round steak	61	184	25

rump roasts and pork picnics were advertised more frequently than most other meats. Of all the meat cuts studied, however, mixed fryer parts was the most frequently advertised meat item in the local area, with advertisements appearing 59 percent of the time.

Frequency tables for each of the nine supermarkets for all meats selected for this study are reported in Table 3. The table shows that the two national, the independent, and one of the voluntary chains

Table 3.
Frequency of Advertising for Selected Meats by Type of Meat and Store

	Regional Chain (1)	Voluntary Chain (2)	Voluntary Chain (3)	National Chain (4)	National Chain (5)	Regional Chain (6)	Regional Chain (7)	Independent (8)	Voluntary Chain (9)
ALL MEATS									
Advertised	61	79	77	127	125	66	62	102	167
Unadvertised	430	438	535	393	369	538	531	248	373
Total	491	517	612	520	494	604	593	350	540
Percent	12	15	13	24	25	11	10	29	31
PORK									
Advertised	6	9	9	20	19	13	12	9	29
Unadvertised	68	40	97	99	78	124	120	34	46
Total	74	49	106	119	97	137	132	43	75
Percent	8	18	8	17	20	9	9	21	39
CHICKEN									
Advertised	7	32	31	63	63	10	10	21	59
Unadvertised	157	181	173	124	126	171	166	74	113
Total	163	213	204	187	189	181	176	95	172
Percent	4	15	15	34	33	6	6	22	34
BEEF									
Advertised	48	38	37	44	43	43	40	72	79
Unadvertised	205	217	265	170	165	243	245	140	214
Total	253	217	302	114	208	286	285	212	293
Percent	19	15	12	39	21	15	14	34	27

advertised more frequently than the other stores when all three types of meat are considered. Each of those three stores advertised more than 100 cuts during the 34-week period. When meat items are grouped by type (pork, chicken, and beef) the same stores which advertised meats more frequently tended to advertise chicken and beef more than the other stores, along with one of the voluntary chains which advertised pork relatively more frequently. Pork cuts, in general, tended to be advertised less frequently, only 15 percent, as compared to chicken, 34 percent, and to beef, 51 percent. Some of the differences are due to the larger number of beef cuts finally selected for this study. However, as indicated previously, when all cuts of each meat were used, it was found that beef was advertised much more frequently than pork or chicken.

Prices of Meats

Tables 4 and 5 show average prices in cents per pound of all the selected meat items, with the meat items as rows and the stores as columns. Table 4 contains the means of the unadvertised prices while Table 5 contains the means of the advertised prices. Table 6 contains the percent discount of the advertised from the unadvertised price. This was calculated by using Equation 2:

$$\text{Eq. 2} \quad \frac{\text{Unadvertised Price} - \text{Advertised Price}}{\text{Unadvertised Price}} \times 100 = \text{Percent Discount}$$

Cuts such as round steak, rump roast, fryers, and rib center cut pork chops were typically discounted by at least 20 percent with round steak discounted by 30 percent. Other cuts such as pork steak, ground beef, porterhouse steak, sirloin steak, and T-Bone steak also tended to be discounted more when advertised than the remaining meat items.

Advertised Prices

The Duncan's Multiple Range Test (DMRT) was used to determine if statistically significant differences existed ($\alpha = .05$) in the means of the advertised prices in each of the nine stores for each meat item. Table 7 contains the results of this test. The stores are listed from the highest mean to the lowest mean prices. Across the rows, all means with the same letter do not have statistically significant differences from each other, while those that have statistically different averages have different letters.

Picnic roasts, loin center cut pork chops, and pork steak did not have significant differences between the price means of the stores that

Table 4.

Unadvertised Price Means of the Selected Cuts of Meat in Cents/Pound in Each Store

	Regional			Voluntary			National			Regional			Independent			Voluntary
	Chain	Voluntary	Chain	Chain	Voluntary	Chain	Chain	Voluntary	Chain	Chain	Voluntary	Chain	Chain	Voluntary	Chain	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)							
Loin end roast	—	154	162	151	175	164	172	—	139							
Rib center cut																
pork chops	210	229	220	227	228	244	242	—	204							
Picnic	109	—	109	98	87	—	—	—	99							
Loin center cut																
pork chops	217	227	227	236	245	251	252	269	217							
Spare ribs	156	154	159	164	166	146	145	110	145							
Pork steak	169	179	159	—	154	164	170	165	132							
Drumsticks	112	119	117	127	129	118	117	114	113							
Fryer	72	71	69	69	69	68	68	70	69							
Mixed parts	69	61	64	59	—	79	—	—	63							
Roasting																
chicken	—	90	95	90	98	75	88	95	79							
Thighs	105	109	111	113	115	108	116	108	109							
Wings	79	82	80	87	95	79	68	77	77							
Whole cut-up	77	74	76	79	76	80	76	77	76							
Ground beef	160	157	148	165	169	153	154	140	149							
Ground chuck	176	180	186	203	204	176	178	167	177							
Ground round	—	193	201	216	217	188	190	—	196							
Porterhouse																
steak	384	369	360	340	364	377	372	353	371							
Sirloin steak	293	291	276	289	289	282	278	280	268							
Stew	216	224	222	256	248	218	218	191	187							
T-Bone steak	371	374	357	328	358	368	369	339	356							
Rump roast	286	270	265	261	295	274	267	—	266							
Chuck roast	—	159	163	—	—	191	166	186	171							
Round steak	264	264	257	338	287	249	251	240	252							

Advertised Price Means of the Selected Cuts of Meat in Cents/Pound in Each Store

	Regional			Voluntary			National			Regional			Voluntary		
	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain	Chain
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)						
Loin end roast	109	136	136	—	—	137	137	137	144						
Rib center cut	—	159	159	192	192	—	—	—	181						
pork chops	—	—	—	85	83	—	—	—	109						
Picnic	—	—	—	—	—	—	—	—	—						
Loin center cut	—	—	—	199	199	179	—	—	188						
pork chops	144	143	143	134	134	143	143	119	149						
Spare ribs	—	—	—	119	124	135	135	136	147						
Pork steak	99	74	74	111	111	99	99	87	104						
Drumsticks	48	57	51	49	49	62	62	55	56						
Fryer	54	57	57	52	52	49	49	—	50						
Mixed parts	—	—	—	—	—	—	—	—	—						
Roasting	—	—	—	—	—	—	—	—	—						
chicken	64	76	76	79	79	68	68	—	60						
Thighs	99	99	99	95	95	—	—	93	96						
Wings	—	69	69	71	71	—	—	59	79						
Whole cut-up	—	66	66	64	64	109	109	52	65						
Ground beef	127	144	144	146	146	129	129	134	150						
Ground chuck	164	159	159	—	—	175	176	162	173						
Ground round	—	—	—	—	—	177	177	189	189						
Porterhouse	—	—	—	—	—	—	—	—	—						
steak	286	—	—	305	296	299	299	—	325						
Sirloin steak	199	249	256	—	—	234	235	—	240						
Stew	186	198	198	—	—	207	207	172	190						
T-Bone steak	277	289	289	286	282	288	288	—	314						
Rump roast	222	194	200	—	309	207	207	196	207						
Chuck roast	127	—	169	—	—	118	118	—	152						
Round steak	181	167	167	182	182	189	189	192	204						

Table 6.

Percent Discount From the Unadvertised Price for All Selected Meat Cuts in Each Store

	Regional Chain (1)	Voluntary Chain (2)	Voluntary Chain (3)	National Chain (4)	National Chain (5)	Regional Chain (6)	Regional Chain (7)	Independent (8)	Voluntary Chain (9)
Loin end roast	—	12	16	—	—	16	20	—	—
Rib center cut	—	—	—	—	—	—	—	—	—
pork chops	—	31	28	15	16	—	—	—	11
Picnic	—	—	—	13	6	—	—	—	—
Loin center cut	—	—	—	—	—	—	—	—	—
pork chops	—	—	—	16	19	29	—	—	13
Spare ribs	8	7	10	18	19	2	1	—	—
Pork steak	—	—	—	—	19	18	21	18	—
Drumsticks	11	38	37	13	14	16	15	24	8
Fryer	33	20	26	29	29	9	9	21	19
Mixed parts	22	7	11	12	—	38	—	—	21
Roasting	—	—	—	—	—	—	—	—	—
chicken	—	16	20	12	19	9	23	—	24
Thighs	6	9	11	16	17	—	—	14	12
Wings	—	16	14	18	25	—	—	23	—
Whole cut-up	—	11	13	19	16	—	—	32	14
Ground beef	21	8	3	12	14	16	16	4	—
Ground chuck	7	12	15	—	—	1	1	3	—
Ground round	—	—	—	—	—	6	7	—	4
Porterhouse	—	—	—	—	—	—	—	—	—
steak	26	—	—	10	19	21	20	—	12
Sirloin steak	32	14	7	—	—	17	15	—	10
Stew	14	12	11	—	—	5	5	10	—
T-Bone steak	25	24	19	13	21	16	22	—	12
Rump roast	22	28	25	—	—	24	22	—	22
Chuck roast	—	—	—	—	—	38	29	—	11
Round steak	24	37	35	46	37	24	25	20	10

Table 7.

Duncan's Multiple Range Test of Advertised Meat Items*

Meat Item	Store							
	9	6	7	8	2	3	1	
Loin end roast	A	A	A	A	A	A	A	
							B	
Picnic	9	4	5					
	A	A	A					
Rib center cut pork chops	4	5	9	2	3			
	A	A	A					
			B	B	B			
Loin center cut pork chops	4	5	9	6				
	A	A	A	A				
Spare ribs	9	1	2	3	6	7	4	5
	A	A	A	A	A	A	A	A
		B	B	B	B	B	B	B
Pork steak	9	8	6	7	5	4		
	A	A	A	A	A	A		
Drumsticks	4	5	9	1	6	7	8	2
	A	A	A	A	A	A	A	A
Fryer	6	7	2	9	8	3	4	5
	A	A	A	A	A	A	A	A
Mixed parts	2	3	1	4	5	9	6	7
	A	A	A					
			B	B	B	B	B	B
Roasting chicken	4	5	2	3	6	7	1	9
	A	A	A	A	A	A	A	A
Thighs	1	2	3	9	4	5	8	
	A	A	A	A	A	A	A	
Wings	9	4	5	2	3	8		
	A	A	A	A	A			
		B	B	B	B	B		
Whole cut-up	6	7	2	9	3	4	5	8
	A	A						
			B	B	B	B	B	
							C	

continued

Table 7 continued.

Meat Item	Store									
Chuck roast	3 A	9 A	1 A	6 A	7 A					
Ground beef	9 A	4 A	5 A	2 A	3 A	8 B	6 B	7 B	1 B	
Ground chuck	7 A	6 A	9 A	1 B	8 B	2 B	3 B			
Ground round	8 A	9 A	6 B	7 B						
Porterhouse steak	9 A	4 B	6 B	7 B	5 B	1 B				
Round steak	9 A	8 A	6 B	7 B	4 B	5 B	1 B	2 C	3 C	
Rump roast	5 A	1 B	6 B	7 C	9 C	3 C	8 C	2 C		
Sirloin steak	3 A	2 A	9 A	6 A	7 A	1 B				
Stew	6 A	7 A	2 B	3 B	9 C	1 C	8 D			
T-Bone steak	9 A	2 A	3 B	6 B	7 B	4 B	5 B	1 B		

*Those means, with the same letter are not significantly different at the $\alpha = .05$ level. The stores' means are ranked from highest to lowest.

advertised. There were some statistically significant differences between the average advertised prices for the other pork cuts. It is also noted that Store 9, a voluntary chain, tended to have higher average prices than the other stores. However, the average prices for Store 9 were not statistically significantly different from those of the other stores. Similarly, Store 1 tended to have lower advertised prices than the other stores.

Four of the seven chicken cuts (drumsticks, fryers, roasting chickens, and thighs) had significantly different prices between stores. Store 8, the independent, had a significantly lower mean price for whole cut-up chicken and there were some significant differences between the mean prices for the other cuts of chicken.

There appear to be more differences among the stores for the average prices of the various cuts of beef than for pork or chicken. However, except for a tendency toward lower prices in Store 1 and higher prices in Store 9 no distinct patterns were apparent. Chuck roast was the only cut for which there were statistically significant differences between the averages of the stores that advertised it. Store 9 did tend to have average beef prices near the upper end of the ranges of prices.

Unadvertised Prices

Table 8 contains the results of the Duncan's Test for the means of unadvertised meat items in each store. The means for the pork cuts do not appear to be very different. Store 9, a voluntary chain, appears in the lower range of means for most of the cuts of pork. As shown in Table 7, this store tended to have higher advertised prices, but the unadvertised prices tended to be lower than the other stores.

Whether a chicken fryer is advertised or unadvertised the mean prices between the stores generally are not significantly different. For mixed parts and whole cut-up chickens, there were no significant differences between the means of unadvertised prices. There were significant differences between the means for the other cuts of chicken in some of the stores but no definite patterns were observed. Store 5 tended to have somewhat lower unadvertised chicken prices while Store 9 tended to have higher prices.

There seemed to be considerable differences between averages for the unadvertised prices of ground beef and ground round. The national chain had higher unadvertised prices for ground beef and also was among the stores with higher prices for ground round. Furthermore, the national chain appeared to be higher in the range of unadvertised mean prices for six of the ten cuts of beef. Stores 8 and 9 tended to have lower unadvertised prices for beef while Stores 1, 4,

Table 8.

Duncan's Multiple Range Test of Unadvertised Meat Items in Each Store*

Meat Item	Store									
Loin end roast	5	7	6	3	2	4	9			
	A	A	A	A	A	A	A			
Picnic	1	3	9	4	5					
	A	A	A							
			B	B	B					
Rib center cut pork chops	6	7	2	5	4	3	1	9		
	A	A	A							
			B	B	B	B				
						C	C	C		
Loin center cut pork chops	8	7	6	5	4	2	3	1	9	
	A	A	A	A	A	A	A			
						B	B	B	B	
Spare ribs	5	4	3	1	2	6	9	7	8	
	A	A	A	A	A					
				B	B	B	B	B		
										C
Pork steak	2	7	1	8	6	3	5	9		
	A	A	A	A	A	A	A			
			B	B	B	B	B	B		
Drumsticks	5	4	2	6	3	7	8	9	1	
	A	A								
			B	B	B	B	B			
							C	C	C	
Fryer	1	2	8	5	9	4	3	6	7	
	A	A	A	A	A	A	A	A	A	
Mixed parts	6	1	3	9	2	4				
	A	A	A	A	A	A				
Roasting chicken	5	8	3	2	4	7	9	6		
	A	A	A	A	A	A	A			
							B	B		

continued

Table 8 continued.

Meat Item	Store									
Thighs	7 A	5 A B	4 A B C	3 B C	9 C D	2 C D	6 C D	8 C D	1 D	
Wings	5 A	4 A B	2 B	3 B	1 B C	6 B C	8 B C	9 B C	7 C	
Whole cut-up	6 A	4 A	8 A	1 A	5 A	7 A	3 A	9 A	2 A	
Chuck roast	6 A	8 A B	9 B	7 B	3 B	2 B				
Ground beef	5 A	4 A B	1 B C	2 C D	7 C D E	6 D E F	9 E F	3 F	8 G	
Ground chuck	5 A	4 A	3 B	2 C	7 C	9 C	6 C	1 C	8 D	
Ground round	5 A	4 A	3 B	9 C	2 C D	7 D E	6 E			

continued

Table 8 continued.

Meat Item				Store					
Porterhouse steak	1	6	7	9	2	5	3	8	4
	A	A B	A B	A B C	A B C	A B C	B C	C D	D
Round steak	5	1	2	3	9	7	6	4	8
	A	B	B C	B C	B C D	C D	D	D	D
Rump roast	5	1	6	2	7	9	3	4	
	A	A B	B C	B C	B C	B C	B C	C	
Sirloin steak	1	2	4	5	6	8	7	3	9
	A	A B	A B C	A B C	A B C	A B C	B C	C	C
Stew	4	5	2	3	6	7	1	8	9
	A	A	B	B	B	B	B	C	C
T-Bone steak	2	1	7	6	5	3	9	8	4
	A	A	A	A	A B	A B	A B	B C	C

*Those means with the same letter are not significantly different at the $\alpha = .05$ level. The stores' means are ranked from highest to lowest.

and 5 tended to have lower prices, that is, tended to have prices in the lower one-third of the range of prices.

All Prices

Table 9 contains the mean prices of each meat item for each store regardless of whether the meat item was advertised or unadvertised.

Table 9.

Mean Prices of Each Meat Item, for Each Store Regardless of Whether the Meat Item is Advertised or Unadvertised (Cents/Pound)

	Regional Chain (1)	Voluntary Chain (2)	Voluntary Chain (3)	National Chain (4)	National Chain (5)	Regional Chain (6)	Regional Chain (7)	Independent (8)	Voluntary Chain (9)
Loin end roast	109	151	155	151	175	160	169	137	142
Rib center cut									
pork chops	210	220	218	222	224	244	242	—	188
Picnic	109	—	109	92	84	—	—	—	102
Loin center cut									
pork chops	217	227	227	235	243	249	252	269	213
Spare ribs	149	148	155	161	163	145	144	111	147
Pork steak	169	179	159	119	139	159	163	161	139
Drumsticks	111	116	114	126	218	117	116	105	110
Fryer	71	69	67	62	62	68	68	66	65
Mixed parts	68	60	62	52	52	64	49	—	56
Roasting									
chicken	64	89	92	90	97	74	86	95	65
Thighs	104	108	110	108	109	108	116	104	106
Wings	79	81	79	86	94	79	68	71	78
Whole cut-up	77	72	73	75	73	81	77	73	73

Table 9 continued.

Meat Item	Regional Chain (1)	Voluntary Chain (2)	Voluntary Chain (3)	National Chain (4)	National Chain (5)	Regional Chain (6)	Regional Chain (7)	Independent (8)	Voluntary Chain (9)
Ground beef	158	156	147	156	158	152	153	136	149
Ground chuck	175	177	182	203	204	176	178	164	175
Ground round	—	193	201	216	217	186	189	189	196
Porterhouse steak	365	369	360	320	337	374	369	353	356
Sirloin steak	271	288	274	289	289	274	276	280	256
Stew	208	217	216	256	248	214	214	178	188
T-Bone steak	349	370	354	316	341	365	366	339	342
Rump roast	264	238	242	261	296	258	253	196	238
Chuck roast	127	159	163	—	—	185	163	186	167
Round steak	256	238	233	214	244	238	239	232	225

The results of the Duncan's Test used to determine if significant differences existed are shown in Table 10. For the different cuts of chicken, pork, and beef, some statistically significant differences between the mean prices were found. Stores 8 and 9, one a voluntary chain and the other an independent, seem to have had lower average prices for most cuts of beef, while Stores 4 and 5 tended to somewhat higher prices.

Table 10.

Duncan's Multiple Range Test for the Means of the Selected Meat Items Regardless of Whether It Is Advertised or Unadvertised*

Meat Item	Store									
Loin end roast	5	7	6	3	4	2	9	8	1	
	A	A	A	A	A	A	A	A		B
Picnic	1	3	9	4	5					
	A	A	A	B	B					
						C				
Rib center cut pork chops	6	7	5	4	2	3	1	9		
	A	A		B	B	B	B			
						C	C	C		D
Loin center cut pork chops	8	7	6	5	4	2	3	1	9	
	A	A	A	A	A	A	A			
						B	B	B	B	
Spare ribs	5	4	3	1	2	9	6	7	8	
	A	A	A							
		B	B	B	B					
			C	C	C	C				
				D	D	D	D	D		E
Pork steak	2	1	7	8	3	6	5	9	4	
	A	A	A	A	A	A	A	A		
		B	B	B	B	B	B	B	B	

continued

Table 10 continued.

Meat Item	Store									
	5	4	6	2	7	3	1	9	8	
Drumsticks	A	A		B	B	B				
				C	C	C	C			
						D	D	D		
								E	E	
Fryer	1	2	6	7	3	8	9	5	4	
	A	A	A	A	A					
		B	B	B	B	B				
			C	C	C	C	C			
							D	D	D	
Mixed parts	1	6	3	2	9	4	5	7		
	A	A								
		B	B	B	B					
						C	C	C		
Roasting chicken	5	8	3	4	2	7	6	9	1	
	A	A	A	A	A					
		B	B	B	B	B				
							C	C	C	
Thighs	7	3	5	2	6	4	9	1	8	
	A									
		B	B	B	B	B	B			
			C	C	C	C	C	C	C	
Wings	5	4	2	1	6	3	9	8	7	
	A	A								
		B	B	B	B	B	B	B		
				C	C	C	C	C	C	
Whole cut-up	6	7	1	4	8	9	5	3	2	
	A	A	A							
		B	B	B	B	B	B	B	B	
Chuck roast	8	6	9	3	7	2	1			
	A	A	A	A	A	A	A			

continued

Table 10 continued.

Meat Item	Store									
Ground beef	5 A	1 A B	4 A B	2 A B	7 A B C	6 B C D	9 C D	3 D	8	E
Ground chuck	5 A	4 A	3 B	7 B C	2 B C	6 C	9 C	1 C	8	D
Ground round	5 A	4 A	3 B	9 C	2 C	8 C D	7 D	6 D		
Porterhouse steak	6 A	7 A B	2 A B	1 A B	3 A B	9 B	8 B	5 C	4 C	
Round steak	1 A	5 B	7 B C	6 B C	2 B C	3 C D	8 C D	9 D	4 E	E
Rump roast	5 A	1 B	4 B C	6 B C	7 B C D	3 C D	9 D	2 D	8	E
Sirloin steak	4 A	5 A	2 A	8 A	6 A	7 A	3 A	1 A	9 A	

continued

Table 10 continued.

Meat Item	Store									
	4	5	2	3	7	6	1	9	8	
Stew	A									
		B								
			C	C	C	C				
						D	D			
								E		
										F
T-Bone steak	2	7	6	3	1	9	5	8	4	
	A	A	A	A						
		B	B	B	B					
				C	C	C	C	C		
										D

*Those means with the same letter are not significantly different at the $\alpha = .05$ level. The stores' means are ranked from highest to lowest.

Table 11 contains the advertised and the unadvertised price means regardless of store. Again, a Duncan's Test was applied. All the cuts had statistically significant differences between advertised mean prices and the unadvertised mean prices except for chicken wings. This confirms that advertised prices for cuts of meat generally are lower than the unadvertised prices. The average discounts range from 4 to 29 percent. For beef, pork, and chicken, the average discounts were 16, 15, and 18 percent, respectively.

Type of Store

The stores were grouped according to type—chain, voluntary chain, and independent. The means and frequencies for these groupings are shown in Table 12. A Duncan's Test was used to determine if there were significant differences between the mean prices for each type of store (Table 13). Loin center cut pork chops, roasting chickens, fryers, wings, ground round, porterhouse steaks, sirloin steaks, T-Bone steaks, chuck roasts, and round steaks were cuts for which there were no statistically significant differences between the store mean prices. Several cuts had differences between two store types while drumsticks, ground beef, ground chuck, and stew meat all had significantly different average prices between all three types of stores. There appear to be fewer differences between the means of the

Advertised and Unadvertised Price Means (Cents/Pound) Regardless of Store and Duncan's Multiple Range Test Where $\alpha = .05$

Meat Item	Advertised		Unadvertised	Difference	Percent		Duncan's Multiple Range Test
					Discount*		
Loin end roast	134	160	26	16		Significantly Different	
Rib center cut pork chops	85	102	17	17		Significantly Different	
Picnic	183	229	36	16		Significantly Different	
Loin center cut pork chops	190	235	45	19		Significantly Different	
Spare ribs	143	149	6	4		Significantly Different	
Pork steak	137	163	26	16		Significantly Different	
Drumsticks	95	119	24	20		Significantly Different	
Fryer	53	69	16	23		Significantly Different	
Mixed parts	53	65	12	18		Significantly Different	
Roasting chicken	68	88	20	23		Significantly Different	
Thighs	95	110	15	17		Significantly Different	
Wings	72	81	9	11		No Significant Difference	
Whole cut-up	66	77	11	14		Significantly Different	
Ground beef	141	155	14	9		Significantly Different	
Ground chuck	167	185	18	10		Significantly Different	
Ground round	181	199	18	9		Significantly Different	
Porterhouse steak	305	366	61	17		Significantly Different	
Sirloin steak	230	282	52	18		Significantly Different	
Stew	193	221	28	13		Significantly Different	
T-Bone steak	292	357	65	18		Significantly Different	
Rump roast	208	274	66	24		Significantly Different	
Chuck roast	145	172	27	16		Significantly Different	
Round steak	183	256	73	29		Significantly Different	

*The average discount for pork, chicken, and beef was 15 percent, 18 percent, and 16 percent, respectively. The average total discount was 16 percent.

Table 12.

The Means (Cents/Pound) of Each Meat Item by Type of Store. Also the Frequency Distribution of Each Meat Item by Type of Store

Meat Items	MEAN		FREQUENCY		
	Chain	Independent	Voluntary Chain	Chain	Independent
Loin end roast	159	137	151	62	5
Rib center cut pork chops	230	—	215	141	—
Picnic	94	—	105	55	—
Loin center cut pork chops	240	269	221	147	1
Spare ribs	152	111	151	97	18
Pork steak	159	161	145	57	19
Drumsticks	120	105	114	148	16
Fryer	66	66	67	144	31
Mixed parts	57	—	59	97	—
Roasting chicken	85	95	87	104	5
Thighs	190	104	108	154	21
Wings	81	71	79	99	3
Whole cut-up	76	73	73	151	19
Ground beef	155	136	151	167	34
Ground chuck	187	164	178	160	34
Ground round	199	189	197	112	3
Porterhouse steak	355	353	361	141	29
Sirloin steak	276	280	273	97	26
Stew	225	178	206	140	23
T-Bone steak	346	339	353	146	23
Rump roast	265	196	239	115	3
Chuck roast	172	186	165	31	3
Round steak	240	232	233	129	34

Table 13.

Duncan's Multiple Range Test on Means of the Selected Meat Items by Store Type*

Loin end roast	Chain A	Voluntary Chain A B	Independent B
Picnic	Voluntary Chain A	Chain B	
Rib center cut pork chops	Chain A	Voluntary Chain B	
Loin center cut pork chops	Independent A	Chain A	Voluntary Chain A
Spare ribs	Chain A	Voluntary Chain A	Independent B
Pork steak	Independent A	Chain A	Voluntary Chain B
Drumsticks	Chain A	Voluntary Chain B	Independent C
Fryer	Voluntary Chain A	Independent A	Chain A

continued

Table 13 continued.

Mixed parts	Voluntary Chain A	Chain B	
Roasting chicken	Independent A	Voluntary Chain A	Chain A
Thighs	Chain A	Voluntary Chain A B	Independent B
Wings	Chain A	Voluntary Chain A	Independent A
Whole cut-up	Chain A	Independent A B	Voluntary Chain B
Chuck roast	Independent A	Chain A	Voluntary Chain A
Ground beef	Chain A	Voluntary Chain B	Independent C
Ground chuck	Chain A	Voluntary Chain B	Independent C
Ground round	Chain A	Voluntary Chain A	Independent A
Porterhouse steak	Voluntary Chain A	Chain A	Independent A

continued

Table 13 continued.

	Chain	Voluntary Chain	Independent
Round steak	A	A	A
	Chain	Voluntary Chain	Independent
Rump roast	A	B	B
	Independent	Chain	Voluntary Chain
Sirloin steak	A	A	A
	Chain	Voluntary Chain	Independent
Stew	A	B	C
	Voluntary Chain	Chain	Independent
T-Bone steak	A	A	A

*Those means with the same letter are not significantly different.

All means are ranked from highest to lowest.

chain, voluntary chain, and independent stores on beef items than on pork and chicken. It is interesting to note that the independent store tended to have lower prices for a majority of the meats analyzed. Of 20 cuts sold in each store type, the independent had lower average prices for 13, of which 8 were statistically significantly lower than the prices for either the chain or voluntary chain.

Analysis of National Retail and Wholesale Prices

This section presents results of regression analyses of the meat price data using six different models. Model I regresses the price of local retail meat cuts of beef and pork with the USDA's weighted average price of retail cuts from the carcass. Model II is used to determine the relationships between local retail prices of selected cuts of beef and pork and the USDA's value of the wholesale quantity equivalent to one pound of retail cuts. Models III and IV were similar to the first two except that the national average retail and wholesale prices were lagged one week. For Models V and VI a stepwise technique was used

with the independent variables including current retail and wholesale prices, the advertised prices, and the retail and wholesale prices lagged from one to six weeks. The stepwise procedure selects the independent variables which are "best" from explanatory and statistical significance.

Retail Prices

Model I was a regression model of the form:

$$RP = a - b_1 RP_{usda} + b_2 SP$$

where

a = intercept

RP = retail price of a meat item in the local area.

RP_{usda} = estimated weighted average price of retail cuts from the carcass.

SP = dummy variable with the value of 1 or 2, where 1 = advertised price and 2 = unadvertised price. In the GLM procedure using SAS the classes statement results in the highest valued classification, in this case 2, being excluded from the model, i.e., being treated as 0 in the usual 0-1 dummy variable approach to regression.

b_1 = regression coefficient for the USDA average retail price of the type of meat (beef or pork).

b_2 = regression coefficient for the dummy variable of the advertised price of a meat item.

Appendix Tables 1 and 2 present the regression results for the pork and beef cuts, respectively. The columns contain stores while the rows contain regression data for each meat cut. The results do indicate, regardless of store or pork cut, that there is not a strong relationship between local retail pork prices and the USDA's weighted average national price of retail pork cuts from the carcass. However, the results do tend to indicate that there are relationships between local beef retail prices and the USDA's weighted average national price of retail beef cuts. The coefficient of determination (R^2) was statistically significant ($\alpha = .01$) for the equation for each store with a range of values from .48 to .98. The coefficients of the dummy variables for nearly all the advertised prices were negative, indicating that when a meat was advertised its price was less than the local retail price for that cut. The discount ranged from .48 to \$1.06 per pound for beef and \$.03 to \$1.40 for pork.²

²In some cases, coefficients for the dummy variables were positive although not statistically significantly different from zero.

Appendix Table 3 contains the results for the beef cuts regardless of store. The prices for all of the beef cuts were significantly related to the USDA's national retail average price ($\alpha = .01$). The coefficient of determination (R^2) ranged from .11 for chuck roast and ground round to .71 for round steak. As expected, the advertised price (dummy variable) was negative in all cases. The discount ranged from about 14 cents per pound for ground beef to 72 cents for round steak.

Wholesale Prices

The regression equations for the wholesale price model were similar to those for the retail model but with average USDA wholesale prices substituted for the USDA retail prices. Appendix Tables 4 and 6 present the results of the regression analyses for the pork and beef cuts, respectively.

Local pork prices appear to be statistically significantly related to the wholesale price. The coefficients of determination, R^2 , ranged from .56 to .82. In all cases where a statistically significant relationship exists, the coefficients for advertised prices (dummy variable) were less than the average retail price.

The results also indicate that local retail beef prices tend to be related to the USDA's value of wholesale quantity equivalent to one pound of retail cuts. The coefficients for prices of round steak were statistically significantly related for all nine stores. The advertised price for round steak ranged from 48 cents to \$1.04 per pound less than the unadvertised prices. Many of the other beef cuts also had statistically significant relationships to the wholesale prices in all the stores.

Appendix Table 6 contains the results for all the beef cuts regardless of store. These tend to confirm that there are relationships between the local retail beef prices and USDA's wholesale values. The R^2 values range from .10 for chuck roast to .71 for round steak. The advertised price (dummy variable) was negative in all cases. The discount ranged from 14 to 73 cents per pound.

Lagged Price Models

Model III was similar to the other regression models except that the independent variables were national retail prices lagged one week.

Appendix Table 7 contains the results of the regression analysis for this model. The equation was found to be statistically significant at the $\alpha = .01$ for all seven cuts. The coefficient of determination, R^2 , ranged from .11 for both chuck roast and ground round to .71 for round

steak. Thus, there is sufficient statistical evidence to suggest relationships exist between the local retail price of beef cuts and USDA's weighted average price of retail cuts lagged one week. However, the results for this model were not markedly superior to those for the model with current retail prices.

Appendix Table 8 shows the results of the regression analysis for Model IV, where USDA's wholesale price was lagged one week for seven cuts of beef. There again appears to be sufficient evidence to suggest that relationships exist between the local retail price and the USDA's wholesale price lagged one week. The R^2 values ranged from .11 for both ground round and chuck roast to .71 for round steak. Again, the lagged price model was not superior in explanatory power or statistical significance to the model with current week wholesale prices.

Stepwise Models

The national retail prices of beef were lagged up to six weeks and tested using a stepwise regression procedure (Appendix Tables 9 and 10). The stepwise procedure confirms the previous model results. In almost all cases the advertised price (SP) variable came into the equations and was highly statistically significant. The other variables, USDA's lagged retail prices, the lagged variables, frequently entered the equations, but no single length of lag appeared to dominate the results. The lagged variables entered the equations more frequently than current values and the one week lag occurred more often than the other lag lengths. The results tend to indicate that local beef prices are somewhat more related to national retail prices in the preceding weeks than to those of the current week. However, as in the one week lag models, the results were not notably superior.

When USDA's wholesale price was lagged up to six weeks for Model VI, using the stepwise procedure, the results again indicate that the advertised price (SP) is a statistically important variable and also that the lagged wholesale prices frequently are statistically significant (Appendix Tables 11 and 12). The results follow a pattern similar to those of the lagged retail prices, but with a tendency to have a slightly lower overall statistical significance for the lagged variables. Current wholesale prices enter the equation more often than in the retail model and no one length of lag dominated the results.

Conclusions

Grocery stores in the local study area seem not to compete strongly on prices of meat although all use advertised specials and price differences do exist. In all cases, the average advertised prices were lower than the unadvertised prices. Gray and Anderson found that advertised prices were approximately 20 percent less, while Rhodes and Abou-Bakr found that advertised prices averaged about 9 percent less than unadvertised prices. This study indicated that the advertised prices were approximately 16 percent less than the unadvertised price. Pork averaged 15 percent less while beef and chicken averaged 16 and 18 percent less, respectively. There were some differences among advertising practices for meat among the stores, although most appeared to be similar. One store tended to have low advertised, but high regular prices, while another tended to practice the opposite. Another store tended to have low advertised prices but to vary in ranking for unadvertised prices. There were some differences between the advertised price means of the same meat items among the other stores, but there were no distinct patterns, although some meat products were treated differently by particular stores.

Beef was advertised more than pork or chicken. This was expected as consumers have demonstrated preferences for beef. The higher priced beef cuts such as rump roasts, porterhouse steak, sirloin steak, and T-Bone steak tend to be discounted more when advertised than the other beef cuts. These items also tend to have a higher price per pound and may have to be discounted more to attract the consumer. Popular items such as round steak and many of the chicken cuts also are discounted relatively more. This is not surprising as these cuts are often bought by the consumer and thus may be used in the stores' pricing policies to attract more customers.

When the stores were grouped by type, it was found that there were no statistically significant differences between the three store types on the mean price of most meat items. This indicates that their pricing strategies are similar although their management and ownership differ.

There were statistically significant differences between the overall price level in each of the stores for some meat items, but few apparent or consistent patterns. However, there was a tendency for one of the voluntary chains to have lower mean unadvertised prices on most items. When this store advertised its meat, its percent discount was not as large as the other stores.

The lagged and stepwise models used in this study reemphasized the important role that advertised prices play in explaining price variation among beef cuts. The local beef prices also were more related to lagged national retail beef prices than to lagged national wholesale prices, a somewhat surprising result, since changes in wholesale prices should precede retail price adjustments.

The evidence from this study suggests that local pork prices are not as related to either national retail or wholesale prices as local beef prices. Beef prices in this local area tended to be correlated with national average prices, but the lack of really strong, close correlations indicates that local factors may tend to have an important influence on the prices in a particular store in the local area.

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APPENDIX

Table 1.
Multiple Regression Model Results for National Retail Pork Prices by Store.^a

Meat Item	Regional Chain 1			Voluntary Chain 2			Voluntary Chain 3			National Chain 4		
	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP
Picnic												
Spare ribs	.16	-.30	-9.19	.12	-1.71	-3.47	.78**	.16	-15.32**	.63**	1.12	-14.39**
Pork steak										.33*	.65	-23.66

Meat Item	National Chain 5			Regional Chain 6			Regional Chain 7			Independent 8			Voluntary Chain 9		
	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP
Picnic	.89**	1.13**	-6.08*												
Spare ribs	.77**	1.30**	-22.11**	.40**	-.38**	-1.69	.01	-.19	-.88	.09	-.79	-2.19	.02	.22	3.07
Pork steak	.41	-.06	-30.12	.50	.86	-33.62	.90**	1.00**	-40.36**	.59**	-.41	-28.32**	.33	1.19	9.93

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

RP = Estimated weighted average price of retail cuts from the carcass for pork.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

^bBlank space indicates that the meat item was not included in this model.

Table 2.
Multiple Regression Model Results for National Retail Beef Prices by Store.^a

Meat Item	Regional Chain 1			Voluntary Chain 2			Voluntary Chain 3			National Chain 4		
	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP
Chuck roast	.64**	-.42*	-34.14**	.17	.02	-12.22*	.24	.54*	3.97	.62**	.80**	-20.77**
Ground beef	.32**	-.10	-11.86**	.55**	.23	-21.93**	.01	-.03	-3.17	.30**	1.00**	0
Ground chuck				.16*	.24*	0	.14*	-.24*	0	.30**	1.00**	0
Ground round				.32**	-2.74**	0	.57**	-3.21**	0	.14	-.15	-34.02
Porterhouse steak	.83**	-.84	-98.44**	.93**	.29	-97.89**	.92**	.18	-91.27**	.65**	1.20	-64.57**
Round steak	.71**	-1.09*	-89.88**	.18	-.43	-41.24**	.71**	-1.97**	-25.02**	1.00**	13.33**	0
Sirloin steak	.98**	-.71**	-95.41**	.80**	.59**	-23.82**	.69**	.43*	-22.35**	.68**	-.47**	0
Stew	.54**	-.59	-30.58**	.55**	-1.68*	-64.59*	.60**	-3.04**	-23.32	.17	-.26	-41.41*
T-Bone steak	.83**	-1.44**	-98.23**									

continued

Table 2 Continued.

Meat Item	National Chain 5			Regional Chain 6			Regional Chain 7			Independent 8			Voluntary Chain 9		
	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP	R ²	RP	SP
Chuck roast		^b		.32	1.31	-56.29	.21	.82	-37.29	.37	.93	0	.08	.59	-15.78
Ground beef	.70**	.86**	-23.90**	.44**	-.37*	-25.25**	.37**	-.34	-26.10**	.37**	.57**	-5.00	.02	-.36	-2.80
Ground chuck	.28**	.91**	0	.31**	-.38**	-.72	.25*	-.36**	-1.93	.19*	.20	-3.92	.14	.45	-6.21
Ground round	.10	.56	0	.70**	-.25**	-9.67**	.70**	-.40**	-12.56**	.17	-.34	0	.03	.06	-6.86
Porter-house steak	.45**	.83	-70.63**	.93**	-.49**	-83.03**	.27*	-.20	-74.30**	.17*	-1.20*	0	.49**	-.63	-46.75**
Round steak	.98**	.49	-10.51**	.67**	-.49	-61.90**	.87**	-.65**	-64.51**	.48**	.02	-48.33**	.68**	-.06	-48.34**
Sirloin steak		^b		.61**	-.21	-49.81**	.29**	-.88	-50.45**	.05	-.43	0	.34**	-2.06*	-35.29*
Stew	.19*	-1.42*	0	.28*	-.14	-9.95*	.27**	-.30	-9.37**	.58**	-.12	-19.40**	.07	.17	+3.09
T-Bone steak	.39**	.48	-76.32**	.95**	-.40**	-83.40**	.85**	-.21	-83.39**	.37**	-1.67**	0	.39**	-1.12	-43.25**

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

RP = Estimated weighted average price of retail cuts from the carcass for beef.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

^bBlank space indicates that the meat item was not included in this model.

Table 3.
Multiple Regression Model Results for National Retail Beef Prices
Regardless of Store.^a

Meat Item	R ²	RP	SP
Chuck roast	.11**	.72	-23.5*
Ground beef	.19**	.10	-13.66**
Ground chuck	.19**	.18	-17.62**
Ground round	.11**	.07	-19.41**
Porterhouse steak	.37**	-.98**	-59.74**
Round steak	.71**	-.11	-72.38**
Sirloin steak	.40**	-.87**	-53.73**
Stew	.24**	-.15	-27.88**
T-Bone steak	.39**	-.95**	-64.00**

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

RP = Estimated weighted average price of retail cuts from the carcass for beef.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

Table 4.
Multiple Regression Model Results for National Wholesale Pork Prices by Store.^a

Meat item	Regional Chain 1			Voluntary Chain 2			Voluntary Chain 3			National Chain 4		
	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP
Picnic												
Spare ribs	.14			^b						.56**	1.15**	-15.83**
Pork steak		-.13	-9.77		-.28	-10.56		.77**	.17	-15.18**	.28	.45
												-27.23

Table 4 Continued.

Meat Item	National Chain 5			Regional Chain 6			Regional Chain 7			Independent 8			Voluntary Chain 9		
	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP
Picnic	.82**	1.32**	-7.49*												
Spare ribs	.77**	1.74**	-22.72**	.37**	-.44**	-3.33	.02	.44	-1.40	.03	-.30	7.05	.02	.21	2.95
Pork steak	.50	1.41	-27.88	.49**	1.03	-31.91**	.81**	.76*	-38.24**	.57**	-.39	-28.89**	.23	.94	15.82

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

WP = Estimated value of wholesale quantity equivalent to one pound of retail cuts.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

^bBlank space indicates that the meat item was not included in this model.

Table 5.
Multiple Regression Model Results for National Wholesale Beef Prices by Store.^a

Meat Item	Regional Chain 1			Voluntary Chain 2			Voluntary Chain 3			National Chain 4		
	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP
Chuck roast							.15	.52	3.51			
Ground beef	.76**	-.84**	-.37.64**	.21*	-.27	-12.91*	.05	-.25	-3.73	.54**	.73*	-19.68**
Ground chuck	.42**	-.38	-10.26**	.52**	.10	-21.35**	.42**	-.01	-26.03**	.12	.80	0
Ground round				.06	.18	0	.13*	-.28*	0	.06	.58	0
Porterhouse steak	.84**	-1.30*	-97.57**	.30**	-3.26**	0	.45**	-3.57**	0	.15	-.71	-32.56
Round steak	.68**	-1.04*	-88.01**	.93**	-.14	-97.21**	.92**	.01	-91.04**	.66**	1.98	-60.37**
Sirloin steak	.98**	-.82**	-94.29**	.23*	-.99	-40.40*	.74**	-2.61**	-24.18**	1.00**	-80.00**	0
Stew	.62**	-1.12**	-31.36**	.75**	.48	-24.53**	.66**	.31	-23.13**	.73**	-.60**	0
T-Bone steak	.81**	-1.49**	-94.50**	.55**	-2.11*	-63.08*	.45**	-3.13**	-29.04	.17	-.26	-40.76*

continued

Table 5 Continued.

Meat Item	National Chain 5			Regional Chain 6			Regional Chain 7			Independent 8			Voluntary Chain 9		
	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP	R ²	WP	SP
Chuck				.30	1.28	-59.39	.18	.18	-46.05	.57	-2.86	0	.07	.46	-16.22
Ground															
beef	.60**	.74*	-22.97**	.43**	-.44	-27.09**	.36**	-.41	-27.76**	.23*	.50*	-5.09	.14	-1.15*	.70
Ground															
chuck	.09	.65	0	.27**	-.45**	.06	.18	-.38*	-1.59	.15	.02	-5.06*	.03	.14	-3.92
Ground															
round	.00	.11	0	.73**	-.35**	-9.86**	.71**	-.50**	-12.96**	.17	-.36	0	.07	.32	-8.39
Porter-															
house															
steak	.43**	.19	-.67.09**	.94**	-.70**	-84.30**	.27*	-.09	-73.01**	.09	-1.12	0	.51**	-1.14	-47.79**
Round															
steak	.98**	.72*	-104.13**	.68**	-.77	-62.73**	.89**	-1.02**	-65.93**	.48**	-.22	-48.80**	.68**	-.08	-48.50**
Sirloin															
steak	1.00**	-1.21**	0	.61**	-.10	-49.23**	.32**	-1.36*	-54.41**	.02	-.35	0	.37**	-2.78**	-38.10**
Stew	.14	-1.53	0	.29*	-.23	-16.09**	.30**	-.45	-9.79**	.61**	-.41	-20.20**	.03	.03	-2.91
T-Bone															
steak	.38**	.05	-74.98**	.97**	-.63**	-84.54**	.89**	-.59	-85.99**	.21*	-1.58*	0	.41**	-1.62*	-44.65**

*Significant @ = .05

**Significant @ = .01

*The independent variables used were:

WP = Estimated value of wholesale quantity equivalent to one pound of retail cuts.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

*Blank space indicates that the meat item was not included in this model.

Table 6.

Multiple Regression Model Results for National Wholesale Beef Prices Regardless of Store.^a

Meat Item	R ²	WP	SP
Chuck roast	.10*	.64	-23.91*
Ground beef	.19**	-.10	-13.70**
Ground chuck	.19**	.02	-17.55**
Ground round	.11**	-.14	-18.80**
Porterhouse steak	.38**	-1.29**	-60.21**
Round steak	.71**	-.25	-72.62**
Sirloin steak	.42**	-1.23**	-54.32**
Stew	.24**	-.35	-28.11**
T-Bone steak	.39**	-1.21**	-62.48**

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

WP = Estimated value of wholesale quantity equivalent to one pound of retail cuts.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

Table 7.

Multiple Regression Model Results Lagged for National Retail Beef Prices Regardless of Store.^a

Meat Item	R ²	RPL ₁	SP
Chuck roast	.11**	.69	-23.94*
Ground beef	.19**	.11	-13.62**
Ground chuck	.19**	.17	-17.63**
Ground round	.11**	.09	-19.45**
Porterhouse steak	.36**	-.82**	-59.30**
Round steak	.71**	-.09	-72.39**
Sirloin steak	.39**	-.78**	-53.65**

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

RPL₁ = Estimated weighted average of retail cuts from the carcass lagged one week.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

Table 8.

Multiple Regression Model Results Lagged for National Wholesale
Beef Prices Regardless of Store.^a

Meat Item	R ²	WPL ₁	SP
Chuck roast	.11*	.71	-23.74*
Ground beef	.18**	-.04	-13.65**
Ground chuck	.19**	.09	-17.56**
Ground round	.11**	-.05	-19.02**
Porterhouse steak	.37**	-1.18**	-60.57**
Round steak	.71**	-.34	-72.80**
Sirloin steak	.43**	-1.24**	-54.70**

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

WPL₁ = Estimated value of wholesale quantity equivalent to one pound of retail cuts lagged one week.

SP = Dummy variable with values 1 and 2.

1 = advertised price of a meat item.

2 = unadvertised price of a meat item.

Table 9.

Statistical Analysis From the General Linear Models Procedure for Independent Variables Selected by Stepwise Procedures for Factors Affecting the Dependent Variable: Local Retail Prices of a Meat Item.^a

Meat Item	Regional Chain Store 1		Voluntary Chain Store 2		National Chain Store 4	
Ground beef	R ²	.65**	R ²	.17*	R ²	.67**
	SP	33.61**	SP	12.24*	SP	18.39**
	RPL ₁	-.42**			RPL ₂	1.77**
Ground chuck					RPL ₄	-1.01
	R ²	.30**	R ²	.56**	R ²	.30**
	SP	12.17**	SP	22.91**	RP	1.01**
Ground round			RPL ₄	.28		
	^b		R ²	.16*	R ²	.52**
			RP	.24*	RPL ₁	3.61**
Porterhouse steak					RPL ₃	-2.67*
	R ²	.83**	R ²	.60**	R ²	.14
	RP	-.84	RP	-4.78*	SP	34.69
Round steak	SP	98.44**	RPL ₂	9.08**		
			RPL ₃	-7.14**		
	R ²	.72**	R ²	.93**	R ²	.68**
Sirloin steak	SP	88.46**	SP	97.40**	SP	65.25**
	RPL ₁	-1.09**			RPL ₁	1.51
	R ²	.99**	R ²	.16*	R ²	1.00**
Stew	SP	96.50**	SP	41.54*	RP	13.33**
	RPL ₂	-.88**				
	R ²	.56**	R ²	.80**	R ²	.73**
T-Bone steak	SP	30.65**	RP	.59**	RPL ₁	-.46**
	RPL ₁	-.69*	SP	23.82**		
	R ²	.83**	R ²	.57**	R ²	.17*
	SP	97.89**	SP	73.39**	SP	42.19*
	RPL ₃	-1.49**	RPL ₅	-1.61*		

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

RPL₁ - RPL₆ = Estimated weighted average price of retail cuts from the carcass lagged from one to six weeks.

^bBlank space indicates that the meat item was not included in this model.

Table 10.

Statistical Analysis From the General Linear Models Procedure for Independent Variables Selected by Stepwise Procedures for Factors Affecting the Dependent Variable: Local Retail Prices of a Meat Item.^a

Meat Item		Regional Chain Store 1		Voluntary Chain Store 2		National Chain Store 4
Ground beef	R ²	.76**	R ²	.17*	R ²	.71**
	WP	-.84**	SP	12.23*	SP	19.59**
	SP	37.64**			WPL ₁	-.90
					WPL ₄	2.89**
Ground chuck					WPL ₅	-1.46
	R ²	.54**	R ²	.51**	R ²	.25**
	WP	-.97**	SP	21.00**	WPL ₂	.98**
	SP	11.36**				
Ground round	WPL ₅	.54*				
	^b		R ²	.06	R ²	.38**
			WP	.18	WP	-1.44
					WPL ₃	1.87**
Round steak	R ²	.75**	R ²	.93**	R ²	.70**
	WP	3.28	SP	97.40**	SP	64.71**
	SP	104.01**			WPL ₂	2.27*
	WPL ₁	-4.44*				
Sirloin steak	R ²	.99**	R ²	.16*	R ²	1.00**
	SP	94.33**	SP	41.54*	WP	-80.00**
	WPL ₅	-.72**				
Stew	R ²	.62**	R ²	.85**	R ²	.78**
	WP	-1.12**	WP	-1.89**	WPL ₆	-.43**
	SP	31.36**	SP	23.36**		
			WPL ₁	2.37**		
T-Bone steak	R ²	.82**	R ²	.56**	R ²	.17*
	SP	95.10**	SP	60.53*	SP	42.19*
	WPL ₅	-1.23*	WPL ₅	-1.65*		
Porterhouse steak	R ²	.84**	R ²	.60**	R ²	.14
	WP	-1.30*	WPL ₂	-7.80	SP	34.69
	SP	97.57**	WPL ₃	12.67**		
			WPL ₅	-7.33**		

*Significant @ = .05

**Significant @ = .01

^aThe independent variables used were:

WPL₁ - WPL₆ = Estimated value of wholesale quantity equivalent to one pound of retail cuts lagged from one to six weeks.

^bBlank space indicates that the meat item was not included in this model.

Table 11.

Stepwise Procedure Model Results for National Retail Beef Prices by Store.

Meat Item	Voluntary Chain							
	3	5	6	7	8	Independent		
Ground beef ^a		R ²	.72** R ²	.48** R ²	.47** R ²	.36**		
		SP	23.15** SP	25.66** SP	27.73** RPL	.68**		
		RPL ₂	.89** RPL ₅	-.43* RPL ₅	.86 RPL ₅			
Ground chuck	R ²	.42** R ²	.28** R ²	.31** R ²	.26** R ²	.27**		
	SP	26.07** RPL ₁	.92** RP	-.39** RPL ₅	-.36** RPL ₆	.45**		
	R ²	.20* R ²	.13 R ²	.76** R ²	.78** R ²			
Ground round	RPL ₆	-.30* RPL ₆	.67 SP	10.60** SP	12.64** SP			
			RPL ₁	-.61** RPL ₁	-1.06** RPL ₁			
			RPL ₄	.38* RPL ₄	.71** RPL ₄			
Porterhouse steak	R ²	.63** R ²	.43** R ²	.95** R ²	.27** R ²			
	RPL ₃	-3.30** SP	66.18** RP	-1.02** SP	72.22** SP			
			SP	81.21** SP				
Round steak	R ²	.92** R ²	.98** R ²	.66** R ²	.89** R ²			
	SP	91.04** SP	105.85** SP	59.53** SP	67.07** SP			
		RPL ₆	.56 RPL ₁		-2.50** RPL ₂			
					1.96*			

continued

Table 11 Continued.

Meat Item	Voluntary Chain		National Chain	Regional Chain		Regional Chain	Independent	
	3		5	6		7	8	
Sirloin steak	R ²	.75**		R ²	.60**	R ²	.59**	
	SP	31.11**		SP	48.50**	SP	65.43**	
	RPL ₄	-1.98**				RPL ₁	-6.20**	
Stew						RPL ₂	7.96**	
	R ²	.75**	R ²	.56**	R ²	RPL ₄	-2.75	
	SP	23.21**	RPL ₅	-6.75**	SP	R ²	.39**	
	RPL ₂	-1.40**	RPL ₆	5.82**	10.71**	SP	9.25**	
T-Bone steak	RPL ₅	-1.03*				RPL ₃	-1.34*	
	R ²	.63**	R ²	.38**	R ²	RPL ₆	1.07*	
	RPL ₂	-3.21**	SP	74.68**	SP	R ²	.84**	
						SP	81.38**	
						RPL ₁	-.82**	
						RPL ₆	.53*	

*Significant @ = .05

**Significant @ = .01

*Blank space indicates that the variable was not included in this model.

Table 12.
Stepwise Procedure Model Results for National Wholesale Beef Prices by Store.

Meat Item	Voluntary Chain			National Chain			Regional Chain			Regional Chain			Independent		
	3			5			6			7			8		
Ground beef	R ²	.04	R ²	.66**	R ²	.46**	R ²	.31**	R ²	.23**					
	WPL ₁	-.24	SP	23.09**	SP	26.27**	SP	25.03**	WPL ₆	.48**					
Ground chuck	R ²	.42**	R ²	.76**	WPL ₄	-.36*									
	SP	26.07**	WP	.36**	R ²	.36**	R ²	.24**	R ²	.17*					
Ground round	R ²	.22*	R ²	-1.64	WPL ₄	-.40**	WPL ₆	-.32**	SP	5.51*					
	WP	-.74*	WP	2.19**	WPL ₂										
Porterhouse steak	R ²	.22*	R ²	.21	R ²	.75**	R ²	.80**	a						
	WPL ₃	.43	WPL ₂	-1.94*	SP	9.38**	SP	12.14**							
Round steak	R ²	.61**	R ²	1.95*	WPL ₄	-.29**	WPL ₄	-.96**							
	WPL ₅	-3.08**	SP	66.18**	SP	82.52**	SP	72.22**	WPL ₄	-1.05					
Round steak	R ²	.92**	R ²	.43**	R ²	.95**	R ²	.27**	R ²	.14					
	SP	91.04**	WP	66.18**	SP	82.52**	SP	72.22**	WPL ₄	-1.05					
Round steak	R ²	.92**	R ²	.98**	R ²	.77**	R ²	.89**	R ²	.43**					
	SP	91.04**	WP	.72*	SP	64.44**	SP	66.30**	SP	47.87**					
Round steak	R ²	.92**	R ²	104.13**	WPL ₂	-.93	WPL ₁	-1.00**							
	SP	91.04**	WP	104.13**	WPL ₂	-.93	WPL ₁	-1.00**							

continued

Table 12 Continued.

Meat Item	Voluntary Chain			National Chain			Regional Chain			Independent		
	3			5			6			7		
Sirloin steak	R ²		.85**				R ²		.60**	R ²	.35**	R ²
	WP		-.82				SP		48.50**	SP	57.47**	WPL ₂
	SP		21.32**							WPL ₁	-1.54*	
	WPL ₆		-1.43**									
Stew	R ²		.73**		R ²	.24*	R ²		.27**	R ²	.35**	R ²
	SP		23.88**		WPL ₆	-1.46*	SP		10.70**	SP	8.43*	SP
	WPL ₃		1.17*							WPL ₅	-.47*	
	WPL ₆		-.70									
T-Bone steak	R ²		.60**		R ²	.38**	R ²		.97**	R ²	.90**	R ²
	WPL ₅		-3.02**		SP	74.68**	SP		80.88**	SP	87.20**	WPL ₄
							WPL ₃				-1.45**	
											WPL ₅	.79

*Significant @ = .05

**Significant @ = .01

"Blank space indicates that the variable was not included in this model.



